

## HITTING PRACTICE TRAINING EQUIPMENT

### Field of the Invention

This invention relates to sports training aids and more particularly to a system for hitting practice for games such as baseball, tennis, table tennis, hockey and street hockey.

### Background of the Invention

5 Many youngsters, as well as adults, are interested in improving their skills in games such as baseball, tennis, and table tennis, hockey and street hockey. Because of this interest, machines have been provided on a commercial basis for pitching game pieces, it's such as balls, to a hitter. The hitter positions himself or herself in a hitting cage and the machine then pitches a plurality of game pieces in sequence to the hitter. The hitter pays for this by inserting coins into a coin  
10 operated mechanism or by paying a cashier.

There are at least three (3) problems with the commercial hitting practice equipment described in the previous paragraph. One problem is that the hitter cannot control when successive game pieces, such as balls, are propelled to the hitter. Another problem is that the  
15 hitter has to travel to the site of the hitting practice machine.

To overcome the above described shortcomings of commercial hitting practice equipment, relatively inexpensive hitting practice equipment is available in which a bat contains a transmitter and switch that is activated when the batter wants a ball propelled to them. The switch is activated by the batter holding the bat, and a signal is transmitted to a receiver in a ball  
20 propulsion unit that initiates the operation of the propulsion unit to propel a ball. The main problem with this prior art apparatus is that all the elements that make up the transmitter, including battery holder and cover, batteries, switch and transmitter are subjected to a lot of mechanical shock and failure of these elements is experienced far too often.

Thus, there is a need in the prior art for improved hitting practice equipment that can be selectively activated by the batter using a transmitter and receiver when they want a game peace,

such as a ball, to be propelled to them to be hit, and the transmitter is not subject to the mechanical shocks of prior art apparatus.

### **Summary of the Invention**

5 The needs of the prior art are satisfied by the present invention. Improved hitting practice equipment is provided that can be selectively activated by the hitter using a transmitter and receiver when they want a game piece propelled to them to be hit, and the transmitter is not subject to the mechanical shocks of prior art apparatus. The improved hitting practice equipment is portable even by pre-teenagers so that an individual operating the equipment can practice anywhere including the individual's yard or a friend's yard.

10 In accordance with the teaching of the present invention the improved hitting practice training equipment has a hitting instrument, such as a bat, racket or paddle, an apparatus for propelling game pieces, such as balls, in front of an individual holding the hitting instrument, and a transmitter located remote from the hitting instrument for initiating the apparatus to propel a game piece in front of the individual. The game piece propelling apparatus includes a receiver for receiving signals transmitted by the transmitter to cause a game piece to be propelled in front of the individual. The individual touches a switch on the transmitter to actuate the transmitter when they wish to initiate the operation of the game piece propelling apparatus, and a few seconds later a game piece is propelled in front of the individual to be hit using the hitting instrument. When the receiver in the propelling apparatus receives a signal from the transmitter  
15 an adjustable timer is started and a few seconds later a mechanism is actuated that forwards a game piece from a replaceable magazine containing a plurality of game pieces into a propulsion mechanism to propel the piece in front of the individual with the hitting instrument. The propulsion mechanism contains a pair of rollers for contacting opposite sides of a game piece that is forwarded from the magazine.

20 The rollers are actuated by motors connected in a circuit with a transportable energy source (e.g. battery or battery eliminator) and are energized only after the adjustable timer is started, thereby prolonging battery life, and are de-energized after a game piece is propelled

toward the individual. When the game piece is propelled by the rollers of the propulsion mechanism the individual attempts to hit the piece, whether it be in the air or on the ground.

### **Description of the Drawings**

5 The invention will be better understood on reading the following Detailed Description of a preferred embodiment of the invention in conjunction with the drawing in which:

Figure 1 shows the preferred embodiment of the invention of a bat, a ball pitching machine, and a home plate with a built in transmitter;

Figure 2 shows a front view of a rear portion of the ball pitching machine;

10 Figure 2A shows a representative front view of a front portion of the ball pitching machine used to create specific types of pitches;

Figure 3 shows a side view of the ball pitching machine;

Figure 4 shows a block diagram of the transmitter and receiver circuitry; and

Figure 5 shows an alternative embodiment of the invention.

### **Detailed Description**

15 The subject invention may be utilized in a number of games including, but not limited to, baseball, tennis, table tennis, hockey and street hockey. However, in the following detailed description the embodiment described is for baseball.

20 Figure 1 shows a hitting practice equipment device 10 in accordance with the preferred embodiment of the invention. Device 10 comprises a bat 11, a pitching machine 12 that propels balls 13 toward a batter / individual holding bat 11, and a home plate 14 with a built in transmitter (not shown) that includes activation switches 15a – 15f that are operated by the batter touching and operating one of switches 15a – 15g with bat 11. In both professional and non-

professional baseball batters often touch the home plate in front of them as they are preparing to receive a pitch and this action is repeated with the present hitting practice training equipment 10.

More particularly, switch 15a is labeled "fastball" and when this switch is operated a fastball pitch is propelled toward the batter. Switch 15b is labeled "curve ball" and when this switch is operated a curve ball pitch is propelled toward the batter. Switch 15c is labeled "slider" and when this switch is operated a slider pitch is propelled toward the batter. Switch 15d is labeled "riser" and when this switch is operated a riser pitch is propelled toward the batter. Switch 15e is labeled "sinker" and when this switch is operated a sinker pitch is propelled toward the batter. Switch 15f is labeled "slowball" and when this switch is operated a slowball pitch is propelled toward the batter. Finally, switch 15g is labeled "random" and when this switch is operated random pitches of the above listed types are sequentially propelled toward the batter.

Once the batter is ready to receive a pitch they touch one of switches 15a – 15g on home plate 14 with the broad end of bat 11 and, responsive thereto, a radio frequency (RF) signal 16 is transmitted to pitching machine 12 where it received by a radio frequency (RF) receiver (not shown) inside machine 12 and a pitching sequence is initiated. Both the transmitter and receiver are described in detail with reference to Figure 4. After receipt of RF signal 16 an adjustable timer is started in the receiver that times a period in the range of one to five seconds at the end of which period pitching machine 12 propels a ball 13 toward the batter with bat 11. The batter then attempts to hit ball 13. More particularly, there is a three position switch 58 on pitching machine 12 (Fig. 3) labeled "Beginner", "Intermediate" and "Expert". When this switch is set at Beginner there is a delay of five seconds before the ball 13 is propelled; when this switch is set at Intermediate there is a delay of three seconds before the ball 13 is propelled; and when this switch is set at Expert there is a delay of one seconds before the ball 13 is propelled. Alternatively, the time delay may be of fixed duration, or a control may be provided by which the delay is continuously variable between roughly one to five seconds.

RF signal 16 is a pulse train with there being one pulse when the batter has selected a fastball by operating switch 15a, two pulses when the batter has selected a curve ball by operating switch 15b, three pulses when the batter has selected a slider by operating switch 15c,

four pulses when the batter has selected a riser by operating switch 15d, five pulses when the batter has selected a sinker by operating switch 15e, six pulses when the batter has selected a slowball by operating switch 15f, and seven pulses when the batter has selected random pitches by operating switch 15g. The ball 13 may be a hard ball or a soft ball generally provided for  
5 baseball games. The ball may also be a hollow ball made of plastic, foam or another material and having a light weight and constructed to limit the speed of the ball and the distance of travel of the ball. This ball is advantageous when the batter is a child generally less than ten years old.

Prior to using hitting practice training equipment 10 the batter positions and adjusts pitching machine 12 so it propels balls into a hitting zone above home plate 14. Details of  
10 pitching machine 12 are given with reference to Figures 2 and 3.

While a radio frequency transmitter and receiver are disclosed herein, an ultrasonic transmitter and receiver or an infra-red emitter and receiver may be utilized with departing from the teaching of the invention.

In addition, the transmitter may include a microphone, such as a neck mounted  
15 microphone, and include voice recognition circuitry and software. The batter speaks one of the word(s) "fastball", "curve ball", "slider", "riser", "sinker", "slowball" or "random" which the voice recognition circuitry recognizes and causes the corresponding number of RF pulses to be transmitted, as described above, to cause ball 13 to be propelled as requested by the batter. Voice recognition circuitry and software are well known in the art, are used in many fields from  
20 telephone information services and word processing dictation software to simpler versions such are now used with cell phones where a caller speaks a pre-programmed persons name and the phone number for that person is automatically dialed. Accordingly, no further discussion is given here of the voice recognition circuitry and software to implement this feature.

Although a baseball pitching machine is the preferred embodiment of the invention, it  
25 will be appreciated by persons of ordinary skill in the art that other embodiments are within the scope of the invention. For example, the apparatus of this invention can be adapted to propel game pieces such as, but not limited to, table tennis balls, tennis balls, hockey pucks, tennis balls,

table tennis balls, hockey pucks and street hockey balls to a player holding a hitting instrument used to hit the game pieces.

In Figure 2 is a front view of the rear portion of game piece propelling apparatus 12 which in the preferred embodiment of the invention is a ball pitching machine. The front portion is shown and described with reference to Figure 2A.

The apparatus 12 includes a base member 20 and a housing 21 pivotably attached on a horizontal axis to the base member. The pivotal attachment is better seen in Fig. 3 and is used to elevate the pitching angle of a ball 13. The base member 20 is adapted to be supported on a support surface such as the ground but may also be placed on an elevated surface. The base member 20 is adapted to hold a transportable energy source such as a battery or batteries 22. However, a small AC-DC converter (not shown) with a jack to plug it into base member 20 may be utilized in lieu of batteries 22. These converters and how to use them are well known in the art.

The housing 21 is provided with a hollow passage 23 in which a ball 13 to be propelled is inserted. There is a pair of motors 24a&b and a pair of actuators such as rollers 25a&b attached to the shaft of each of the motors that are mounted on the left and right side of passage 23. The rollers 25a&b are preferably made from a resilient material and are preferably extended into the hollow passage 23 to grip the opposite ends of the ball 13 in the passage 23 and to propel ball 13 from the passage 23 in accordance with the rotational speed of the rollers 25a&b. The motors 24a&b and the rollers 21a&b may be considered as a "propulsion mechanism".

The ball 13 in passage 23 is normally not in contact with rollers 25 but when a ball is to be pitched a motor driven piston (not shown in Fig. 2, but shown in Fig. 3) is actuated that pushes ball 13 in passage 23 into contact with rollers 25a&b. Then rollers 25a&b contact the ball and propel it from ball propelling apparatus 12 toward the batter and home plate 14 at a speed determined in accordance with the rotational speed of the rollers 25a&b.

In order to cause one the fastball, curve ball, slider, riser, sinker, slowball or random pitches, idler rollers that are shown in and described with reference to Figure 2A are brought into

minimal contact with a ball 13 being propelled. These idler rollers are not shown in Figure 2 so that the above described "propulsion mechanism" may be better seen and understood.

The top of ball propelling apparatus 12 has an opening 26 into which is inserted a removable, preferably transparent, magazine 27 filled with balls 13. While eight balls 13 are shown in magazine 27 in Fig. 2 the actual number of balls, fewer or greater, is determined by the length of magazine. By having a replaceable ball magazine a number of magazines may be utilized.

Gravity causes balls 13 to move downward in magazine 27 so there is always a ball 13 in passage 23 until all balls have been pitched. When a ball is to be pitched, the batter activates the transmitter in home plate 14 by touching switch 15 as previously described.

After receipt of the RF signal 16 in RF receiver (not shown in Fig. 2, but shown in Fig. 3) a timer is started in the receiver that times a period in the order of three seconds at the end of which period a motor 31 operated piston 30 (not shown in Fig. 2, but shown in Fig. 3) in pitching machine 12 is actuated that pushes ball 13 in passage 23 into contact with rollers 25. Rollers 25a&b contact the ball and propel it from ball propelling apparatus 12 toward the batter and home plate 14 at a speed determined in accordance with the rotational speed of the rollers 25.

Figure 2A shows a front view of a front portion 51 of the ball pitching machine 12. It is a representative depiction of the operations performed and those skilled in the art can make numerous changes and provide the desired operation. Front portion 51 may be deleted for embodiments of the invention other than baseball and table tennis where a ball, puck etc. do not need any "spin" placed thereon, such as in hockey. After a ball 13 is propelled by rollers 25a&b it travels through portion 51 between idler rollers 54a-d as shown. Ones of idler rollers 54a-d are selectively moved a small amount to barely touch ball 13 as it passes between idler rollers 54a-d to create a drag on the ball that causes all pitches except a fastball. For a slider, side idler roller 54b is caused to touch ball 13 to thereby cause rotation of the pitched ball that causes it to curve away from the batter. For a slow ball, idler rollers 54a-d are all caused to touch ball 13 to thereby slow it down. For a riser, top idler roller 54c is caused to touch ball 13. For a sinker, bottom idler roller 54d is caused to touch ball 13.

To bring idler rollers 54a-d into minimum engagement with a propelled ball 13, these idler rollers are positioned and turn freely on shafts (not shown). Each roller and associated shaft are attached to one of movable base plates 55a-d. Each baseplate is in turn connected to one of solenoids 56 a-d. As each of these solenoids is operated the base plate to which it is connected is moved, thereby moving the idler roller mounted thereon into a position where the edge of the roller will minimally contact a ball 13 as it is propelled past the idler rollers. This minimal contact causes ball 13 to spin as it travels and the previously described pitches are created.

In Figure 3 is shown a side view of game piece propelling apparatus 12 which in the preferred embodiment of the invention is a ball pitching machine.

As described with reference to Figure 2 apparatus 12 includes a base member 20 and a housing 21 pivotably attached on a horizontal axis to the base member 20 at a pivot member 28. Pivot member may be loosened to change the angle of elevation of housing 21 to adjust the upward pitching angle of a ball 13 and is then re-tightened. The base member 20 is adapted to be supported on a support surface such as the ground but may also be placed on an elevated surface. The base member 20 is adapted to hold a transportable energy source such as a battery or batteries 22 but a small AC-DC converter may be utilized in lieu of batteries 22.

As previously described housing 21 has a hollow passage 23 in which a ball 13 to be propelled is inserted. There is also a pair of motors 24 and a pair of actuators such as rollers 25 attached to the shaft of each of the motors. The rollers 25 are preferably made from a resilient material and are preferably extended into the hollow passage 23 to grip the opposite ends of the ball 13 in the passage 23 and to propel ball 13 from the passage 23 in accordance with the rotational speed of the rollers 25.

The front portion 51 of ball pitching machine 12 has idler rollers 54a-d, movable base plates 55a-d and solenoids 56a-d the collective function of which is to create certain types of pitches that have already been described with reference to Figure 2B so are not repeated here.

The lowest ball 13 is in passage 23 and is normally not in contact with rollers 25 but when a ball is to be pitched, a solenoid 31 with piston 30 attached thereto is actuated. Piston 30



pushes ball 13 in passage 23 into contact with rollers 25. Rollers 25 contact ball 13 and propel it from apparatus 12 toward the batter and home plate 14 at a speed determined in accordance with the rotational speed of the rollers 25.

As described previously there is a magazine 27 of balls 13 inserted into hole 26 and gravity feeds these balls into passage 23.

To cause this to happen, RF receiver 29 receives the pulse train RF signal 16 transmitted from home plate 14 and initiates a pitch following a period in the order of one to five seconds, as determined by the setting of three position "Beginner, Intermediate, Expert" switch 58 as previously described with reference to Figure 1, at the end of which time period motor 31 driven piston 30 is fully actuated and pushes ball 13 in passage 23 into contact with drive rollers 25 to be pitched. The batter has this time to bring bat 11 to their shoulder in preparation of hitting the ball 13 to be pitched.

Also as previously described, depending on the type of pitch selected by a batter, a pulse train from one to six pulse long is transmitted by the transmitter 32 in home plate 14 (Fig. 1) and is received by RF receiver 29 in ball pitching machine 12. Logic circuitry associated with receiver 29 decodes the number of pulses and actuates ones of idler rollers 54 a-d to create the selected pitch.

In Figure 4 is shown a simplified block diagram of the transmitter circuitry 32 located in home base 14 and the receiver circuitry 29 located in ball propelling apparatus 12.

As previously described, transmitter 32 is located in home plate 14 along with a transportable energy source such as a battery or batteries, but a small AC-DC converter may also be utilized in lieu of batteries. The transmitter is used to transmit a pulsed RF signal 16 to receiver 29 in pitching apparatus 12 when a batter wishes to initiate a pitch of a selected type, as previously described.

In one embodiment, transmitter 32 includes an oscillator 33 for producing signals at a particular frequency such as approximately thirty-two megahertz (32 MHz). The oscillator 33

may be crystal controlled. The signals from oscillator 33 may be amplified by amplifier 34 and the amplified signals are applied to antenna via antenna matching circuit 35 to be transmitted. When a batter touches one of switches 15a-g on home plate 14 to initiate a selected type of pitch, the selected switch 15 causes logic circuit 47 to apply power to oscillator 33 in a pulsed manner and thereby causes a pulsed RF signal 16 to be transmitted. For example, if switch 15f on homeplate 14 is operated by a batter, indicating that they want a slowball to be pitched, six pulses are output from oscillator 33. This pulsed operation is previously in this description.

RF receiver 29 in pitching apparatus has a tuned antenna 37 that receives the pulsed 32 MHz RF signal 16 transmitted by the transmitter in home plate 14. By having a tuned antenna extraneous signals will not trigger the pitch of a ball 13. RF amplifier 38 amplifies the received RF signal. Using the example in the previous paragraph, the received RF signal has six pulses indicating that a slowball is to be pitched. The presence of the amplified, pulsed RF signal is detected at 32 MHz detector 39. The number of pulses in the pulsed 32 MHz signal is detected by logic circuit 48 and starts timer 40 that times a period of between one and five seconds, as selected by three position switch 59 in ball pitching machine 12, as previously described. At the end of the timed period driver 41 outputs a signal that actuates motor 31 to thereby causes motor driven piston 30 to push adjacent ball 13 between the two rollers 25 to be propelled towards the batter and home plate 14 as previously described.

As ball 13 is propelled by rollers 25a&b it passes between idler rollers 54a-d (Figs. 2 & 3). Responsive to the number of pulses in the received RF signal logic circuit 48 causes ones of solenoids 56a-d to be actuated, thereby moving idler rollers 54a-d, all as previously described, to provide the type of pitch indicated by the batter using switches 15a-g on home plate 14. These idler rollers 54a-d are actuated just prior to ball 13 being propelled.

In an alternative embodiment of the invention the invention may be used to propel table tennis balls toward a player who wishes to practice their table tennis ball returns. Such a player is figuratively shown in Figure 5 holding a table tennis paddle. For table tennis and other games, such as tennis, there is no home plate so the transmitter must be positioned in a different location. The transmitter is relatively small container 45 with seven buttons thereon

(corresponding to switches 15a-g on home plate 14) that is mounted on the players belt, or on a player wrist with a strap, both as shown in Figure 5. With their free hand the player actuates ones of the buttons on the transmitter when they wish to initiate a ball being propelled toward them.

- 5        While what has been described here in the preferred embodiment of the invention, it should be understood that numerous changes will be apparent to persons of ordinary skill in the art and may be made without departing from the spirit and scope of the invention. The invention is, therefore, to be limited only as indicated by the scope of the claims.

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What is claimed is: